

Department of Statistical and Actuarial Sciences AS2427B Long Term Actuarial Mathematics

Course outline for Winter 2021



Although this academic year might be different, Western University is committed to a **thriving campus**. We encourage you to check out the [Digital Student Experience](#) website to manage your academics and well-being. Additionally, the following link provides available resources to support students on and off campus: <https://www.uwo.ca/health/>.

Technical Requirements and Important Dates:



Stable internet connection



Laptop or computer



Working microphone



Working webcam



Classes Start	Reading Week	Classes End	Study day(s)	Exam Period
January 11	February 15 - 19	April 12	April 13	April 14 - 30

* March 15, 2021: Last day to drop a second-term half course or a second-term full course without penalty

1. Course Information

Course Information

Course Name: Long Term Actuarial Mathematics

Course Number: AS 2427B

Term: Winter

Location: Online Delivery

Lecture hour: Mon, Wed, Fri 12:30 PM – 1:30 PM

Tutorial: Tue 2:30 PM – 3:30 PM

List of Prerequisite(s) AS2553A/B, Stats2857A/B, and Cal2402A(or Cal2502+2503) with a minimum grade of 60% in each of these courses

List of Antirequisite(s) The former Actuarial Science 3429 A/B or 3431 A/B

Unless you have either the requisites for this course or written special permission from your Dean to enroll in it, you may be removed from this course and it will be deleted from your record. This

decision may not be appealed. You will receive no adjustment to your fees in the event that you are dropped from a course for failing to have the necessary prerequisites.

2. Instructor Information



Course Coordinator	Contact Information
TBD	

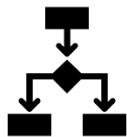
Instructor(s) or Teaching Assistant(s)	Contact Information
Kyle Leistner (Instructor)	kleistne@uwo.ca
Pouya Faroughi (TA)	pfarough@uwo.ca
Yuying Li	Yli2982@uwo.ca

Office Hours	Zoom or MS Teams or in Person	Names
Friday 9:30 to 12:30	Zoom	Kyle Leistner

Students must use their Western (@uwo.ca) email addresses when contacting their instructors.

3. Course Syllabus, Schedule, and Delivery Mode

Models for the time until death, single life annuity and life insurance present values and their probability distributions; introduction to equivalence principle and premium calculations.



Type	Mode	Dates	Time	Frequency
Lecture	Asynchronous online	N/A	3 hours	weekly
Tutorial	Synchronous online	Tuesday	2:30 to 3:30	weekly

For additional help and information throughout the semester, there will be a Q&A set up in the OWL Forum. Also, you can book schedule an appointment with either the instructor or a TA outside of regular office hours for additional help.

Learning Outcomes



Upon successful completion of this course, students will be able to:

- Calculate and interpret standard functions including survival and mortality probabilities, force of mortality, and complete and curtate expectation of life.
- Calculate and interpret probabilities, means, variances, and percentiles.
- Calculate and interpret the effect of changes in underlying assumptions such as mortality and interest.

- Apply appropriate approximation methods such as uniform distribution of deaths, constant force, Woolhouse, and Euler.
- Calculate and interpret probabilities, means, variances, and percentiles of random variables associated with a premium, including loss-at-issue random variables

Canadian Institute of Actuaries Actuarial Exam Accreditation

This course is accredited under the Canadian Institute of Actuaries (CIA) [University Accreditation Program](#) (UAP). Achievement of the minimum required grades in accredited courses may provide credit for preliminary exams. Please note that a combination of courses may be required to achieve exam credit. Details of required courses and grades at Western University are [available at](#):

<https://www.cia-ica.ca/membership/university-accreditation-program-home>

In addition to the university's internal policies on conduct, including academic misconduct, candidates pursuing credits for writing professional examinations shall also be subject to the [Code of Conduct and Ethics for Candidates in the CIA Education System](#) and the associated [Policy on Conduct and Ethics for Candidates in the CIA Education System](#). For more information, please visit [Obtaining UAP Credits](#) and the [CIA FAQ.](#)"

Students need Act Sci 2427 (minimum grade of 75%), Act Sci 3429 (minimum grade of 80%), and Act Sci 3431 (minimum grade of 80%) in order to be eligible to receive a credit for SOA Exam LTAM.

Table of Contents and Schedule



Week	Dates	Topic	Instructor
1	Jan 11 – 15	Introduction to life insurance	KL
2	Jan 18 – 22	Future lifetime random variables, survival functions, force of mortality, International Actuarial Notation, expected complete and curtate future lifetime	KL
3	Jan 25 – 29	Life tables, fractional age assumptions Select and ultimate mortality models, mortality trends <i>(Quiz 1)</i>	KL
4	Feb 1 – 5	Select and ultimate mortality models, mortality trends	KL
5	Feb 8 – 12	Valuation of insurance benefits – continuous case <i>(Midterm test 1)</i>	KL
6	Feb 15 – 19	Reading Week	N/A
7	Feb 22 – 26	Valuation of insurance benefits – annual case <i>(Quiz 2)</i>	KL
8	Mar 1 – 5	Valuation of insurance benefits – $1/m^{\text{thly}}$ case	KL
9	Mar 8 –12	Varying Life Insurance (non-level benefit) <i>(Midterm test 2)</i>	KL

10	Mar 15 – 19	Review of annuity-certain formulas, annual life annuities (Quiz 3)	KL
11	Mar 22 – 26	Life annuities payable 1/mthly and other annuities	KL
12	Mar 29 – Apr 2	Premium calculations	KL
13	Apr 5 – 9	Final exam review (Quiz 4)	KL
14	Apr 12		KL

For the weeks in the table above that indicate a midterm will take place, this is tentative.

4. Course Materials

Textbook: Actuarial Mathematics for Life Contingent Risks (AMLCR) by Dickson, C.M.D., Hardy, M.R., and Waters, H.R., 2013, Third Edition.

It is available at the bookstore in both hard copy and ebook:

https://bookstore.uwo.ca/textbook-search?campus=UWO&term=W2020B&courses%5B0%5D=001_UW/ASC2427B

A solutions manual for the Actuarial Mathematics text has been published and this can be purchased online from Amazon.



Students should check OWL (<http://owl.uwo.ca>) on a regular basis for news and updates. This is the primary method by which information will be disseminated to all students in the class. Students are responsible for checking OWL on a regular basis.

All course material will be posted to OWL: <http://owl.uwo.ca>. Any changes will be indicated on the OWL site and discussed with the class.

If students need assistance, they can seek support on the [OWL Help page](#). Alternatively, they can contact the [Western Technology Services Helpdesk](#). They can be contacted by phone at 519-661-3800 or ext. 83800.

[Google Chrome](#) or [Mozilla Firefox](#) are the preferred browsers to optimally use OWL; update your browsers frequently. Students interested in evaluating their internet speed, please click [here](#).

5. Methods of Evaluation

The overall course grade will be calculated as listed below:

Quizzes (4)	20%
Midterm 1	15%
Midterm 2	15%
Final Exam	50%

Quizzes: There will be four 30-minute quizzes to be held during the Tuesday tutorial timeslot on the following dates: **Tuesday January 26, February 23, March 16 and April 8.** Each quiz will consist of a few short answer questions on recently covered lecture topics.

Midterms or Tests: There will be two one-hour tests held during the tutorial time. The dates of these tests will be announced on the course website.

Final Exam: A three-hour final exam will be scheduled by the Registrar's Office in the final examination period.

Calculators: Any non-programmable calculator may be used in this course.

Click [here](#) for a detailed and comprehensive set of policies and regulations concerning examinations and grading.

Accommodated Evaluations

- The weight of a missed test or quiz will be transferred to the final exam
- If a make-up assessment is missed, the student will receive an INC and complete the task the next time the course is offered

Rounding of Marks Statement

Across the Sciences Undergraduate Education programs, we strive to maintain high standards that reflect the effort that both students and faculty put into the teaching and learning experience during this course. All students will be treated equally and evaluated based only on their actual achievement. **Final grades** on this course, irrespective of the number of decimal places used in marking individual assignments and tests, will be calculated to one decimal place and rounded to the nearest integer, e.g., 74.4 becomes 74, and 74.5 becomes 75. Marks WILL NOT be bumped to the next grade or GPA, e.g. a 79 will NOT be bumped up to an 80, an 84 WILL NOT be bumped up to an 85, etc. The mark attained is the mark you achieved, and the mark assigned; requests for mark "bumping" will be denied.

6. Accommodation and Accessibility

Accommodation Policies

Students with disabilities work with Accessible Education (formerly SSD) which provides recommendations for accommodation based on medical documentation or psychological and cognitive testing. The Academic Accommodation for Students with Disabilities policy can be found at:

https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic_Accommodation_disabilities.pdf

Academic Consideration for Student Absence

Students will have up to two (2) opportunities during the regular academic year to use an on-line portal to self-report an absence during the semester, provided the following conditions are met: the absence is no more than 48 hours in duration, and the assessment for which

consideration is being sought is worth 30% or less of the student's final grade. Students are expected to contact their instructors within 24 hours of the end of the period of the self-reported absence, unless noted on the syllabus. Students are not able to use the self-reporting option in the following circumstances:

- for exams scheduled by the Office of the Registrar (e.g., December and April exams)
- absence of a duration greater than 48 hours,
- assessments worth more than 30% of the student's final grade,
- if a student has already used the self-reporting portal twice during the academic year

If the conditions for a Self-Reported Absence are *not* met, students will need to provide a Student Medical Certificate if the absence is medical, or provide appropriate documentation if there are compassionate grounds for the absence in question. Students are encouraged to contact their Faculty academic counselling office to obtain more information about the relevant documentation.

Students should also note that individual instructors are not permitted to receive documentation directly from a student, whether in support of an application for consideration on medical grounds, or for other reasons. **All documentation required for absences that are not covered by the Self-Reported Absence Policy must be submitted to the Academic Counselling office of a student's Home Faculty.**

For policy on Academic Consideration for Student Absences - Undergraduate Students in First Entry Programs, see:

https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic_Consideration_for_absences.pdf

and for the Student Medical Certificate (SMC), see:

http://www.uwo.ca/univsec/pdf/academic_policies/appeals/medicalform.pdf

Religious Accommodation

Students should consult the University's list of recognized religious holidays, and should give reasonable notice in writing, prior to the holiday, to the Instructor and an Academic Counsellor if their course requirements will be affected by a religious observance. Additional information is given in the Western Multicultural Calendar:

<https://multiculturalcalendar.com/ecal/index.php?s=c-univwo>

You may also be eligible to write the Special Exam if you are in a "Multiple Exam Situation" (see http://www.registrar.uwo.ca/examinations/exam_schedule.html).

7. Academic Policies

The website for Registrarial Services is <http://www.registrar.uwo.ca>.

In accordance with policy, <http://www.uwo.ca/its/identity/activatenonstudent.html>, the centrally administered e-mail account provided to students will be considered the individual's official university e-mail address. It is the responsibility of the account holder to ensure that e-mail received from the University at his/her official university address is attended to in a timely manner.

Contingency plan for an in-person class pivoting to 100% online learning

In the event of a COVID-19 resurgence during the course that necessitates the course delivery moving away from face-to-face interaction, all remaining course content will be delivered entirely online, either synchronously (i.e., at the times indicated in the timetable) or asynchronously (e.g., posted on OWL for students to view at their convenience). The grading scheme will **not** change. Any remaining assessments will also be conducted online as determined by the course instructor.

All of the remote learning sessions for this course will be recorded.

The data captured during these recordings may include your image, voice recordings, chat logs and personal identifiers (name displayed on the screen). The recordings will be used for educational purposes related to this course, including evaluations. The recordings may be disclosed to other individuals participating in the course for their private or group study purposes. Please contact the instructor if you have any concerns related to session recordings.

Participants in this course are not permitted to record the sessions, except where recording is an approved accommodation, or the participant has the prior written permission of the instructor.

The use of cell phones is permitted during the upload period of the test in order to upload answers to Gradescope. During the testing period, cell phones are not permitted.

Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following Web site:

http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf.

Tests and examinations in this course will be conducted using both Zoom and the remote proctoring service, such as Proctortrack.

When Zoom is used for exam invigilation, you will be required to keep your camera on for the entire session, hold up your student card for identification purposes, and share your screen with the invigilator if asked to do so at any time during the exam. The exam session using Zoom will not be recorded.*

Proctortrack will require you to provide personal information (including some biometric data). The session will be recorded. By taking this course, you are consenting to the use of this software.

More information about remote proctoring is available in the Online Proctoring Guidelines at the following link:

<https://www.uwo.ca/univsec/pdf/onlineproctorguidelines.pdf>

Completion of this course will require you to have a reliable internet connection and a device that meets the system and technical requirements for both Zoom and Proctortrack. Information about the system and technical requirements are available at the following links: <https://www.proctortrack.com/tech-requirements/>

<https://support.zoom.us/hc/en-us>

* Please note that Zoom servers are located outside Canada. If you would prefer to use only your first name or a nickname to login to Zoom, please provide this information to the instructor in advance of the test or examination.

Professionalism & Privacy

Western students are expected to follow the [Student Code of Conduct](#). Additionally, the following expectations and professional conduct apply to this course:



- Students are expected to follow online etiquette expectations provided on OWL
- All course materials created by the instructor(s) are copyrighted and cannot be sold/shared
- Recordings are not permitted (audio or video) without explicit permission
- Permitted recordings are not to be distributed
- Students will be expected to take an academic integrity pledge before some assessments
- All recorded sessions will remain within the course site or unlisted if streamed

Copyright Statement

Please be aware that all course materials created by the instructor(s) are copyrighted and cannot be **sold/shared**. Those include materials used in tests/quizzes, midterms, and finals. Any posting/sharing of such materials in part or whole without owner's consent is considered as violation of the Copyright Act and will be considered as a scholastic offence.

In addition, online services such as Chegg are actively monitored. Any questions that are coming out during midterms and finals and are posted to an online service will be searched. Such an activity will be considered as a scholastic offence and will result in academic penalty.

8. Support Services

Please visit the Science & Basic Medical Sciences Academic Counselling webpage for information on add/drop courses, academic considerations for absences, appeals, exam conflicts, and many other academic related matters: <https://www.uwo.ca/sci/counselling/>

Please contact the course instructor if you require lecture or printed material in an alternate format or if any other arrangements can make this course more accessible to you. You may also wish to contact Student Accessibility Services (SAS) at (519) 661-2147 if you have any questions regarding accommodations.

Western University is committed to a thriving campus as we deliver our courses in the mixed model of both virtual and face-to-face formats. We encourage you to check out the Digital Student Experience website to manage your academics and well-being: <https://www.uwo.ca/se/digital/>.

Learning-skills counsellors at the Student Development Centre (<http://www.sdc.uwo.ca>) are ready to help you improve your learning skills. They offer presentations on strategies for

improving time management, multiple-choice exam preparation/writing, textbook reading, and more. Individual support is offered throughout the Fall/Winter terms in the drop-in Learning Help Centre, and year-round through individual counselling.

Students who are in emotional/mental distress should refer to Mental Health@Western (http://www.health.uwo.ca/mental_health) for a complete list of options about how to obtain help.

Additional student-run support services are offered by the USC, <http://westernusc.ca/services>.